What is claimed is:

1. A method of ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel in fluid communication with the fluid inlet port; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising at least one ultrasonic transducer, the first fluid channel extending from the inlet port to the ultrasonic cavity and the ultrasonic transducer being operative to establish an acoustic standing wave field in particle-bearing fluid in the first fluid channel at the ultrasonic cavity;

B) introducing fluid comprising fluid-borne particles into the fluid-handling device via the fluid inlet port; and

C) ultrasonically manipulating fluid-borne particles in the fluid by actuating the ultrasonic transducer to establish in the fluid in the ultrasonic cavity an ultrasonic standing wave operative to effect movement of fluid-borne particles in the fluid.

2. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises trapping fluid-borne particles against flow of the fluid at a node of the standing wave.

3. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises causing fluid-borne particles to move from a fluid flowing in the first fluid channel to move into a fluid flowing in a second fluid channel.

4. The method of claim 3 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein the particles move through an aperture in a manifold wall separating the first fluid channel from the second fluid channel.

5. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises causing fluid-borne particles to agglomerate into larger particles.

6. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein

the fluid-borne particles comprise solid phase extraction (SPE) particles;

step (B) comprises passing the fluid-borne SPE particles in the fluid in the first fluid channel; and

ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at a node of the standing wave.

7. The method of claim 6 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein step (B) comprises solid phase extraction by the fluid-borne SPE particles from the fluid as the fluid-borne SPE particles are passing in the first fluid channel.

8. The method of claim 6 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at a node of the standing wave and holding fluid-borne particles at the node against a flow of the fluid introduced in step (B).

9. The method of claim 6 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at a node of the standing wave, holding fluid-borne particles at the node against a flow of fluid introduced in step (B), and then holding the fluid-borne particles at the node against a flow of a second fluid.

10. The method of claim 9 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein step (C) comprises solid phase extraction by the fluid-borne SPE particles from the fluid introduced in step (B) as the fluid-borne SPE particles are held against a flow of the fluid introduced in step (B).

11. The method of claim 10 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein the second fluid is a solvent for an analyte extracted by the fluid-borne particles from the fluid introduced in step (B).

12. The method of claim 9 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein step (C) comprises solid phase extraction by the fluid-borne SPE

particles from the fluid introduced in step (C) as the fluid-borne SPE particles are held against a flow of the fluid introduced in step (C).

13. The method of claim 6 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at a node of the standing wave, and then releasing the fluid-borne particles by changing the ultrasonic standing wave in the ultrasonic cavity.

14. The method of claim 6 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at a node of the standing wave and then moving collected fluid-borne particles by moving the node relative to the ultrasonic cavity by moving the ultrasonic transponder.

15. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein

the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity, the intersection comprising a passageway through a dividing wall between the first and second fluid channels.

16. The method of claim 15 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein the ultrasonic particle manipulator further comprises analog

electronic controls operative to continuously vary the position of the variable asymmetric standing wave through the intersection.

17. The method of claim 15 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein the ultrasonic particle manipulator further comprises analog electronic controls operative to step-wise vary the position of the variable asymmetric standing wave through the intersection.

18. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein

step (B) comprises passing fluid-borne particles in the fluid in the first fluid channel to the ultrasonic cavity, and

step (C) comprises collecting fluid-borne particles at a node of the standing wave, holding fluid-borne particles at the node against a flow of the fluid introduced in step (B), and then holding the fluid-borne particles at the node against a flow of a second fluid.

19. The method of claim 18 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C) further comprises releasing the fluid-borne particles by changing the ultrasonic standing wave in the ultrasonic cavity.

20. The method of claim 18 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein ultrasonically manipulating fluid-borne particles in step (C)

further comprises moving collected fluid-borne particles by moving the node relative to the ultrasonic cavity.

21. The method of claim 1 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, further comprising, after step (C), the step of effecting a further change in the movement of the fluid-borne particles by changing the location of a node of the ultrasonic standing wave in the ultrasonic cavity.

22. The method of claim 21 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein:

the ultrasonic cavity has a transverse cross-sectional configuration that is non-uniform and the ultrasonic particle manipulator is operative to selectively position an ultrasonic standing wave field in the particle-bearing fluid in the fluid-handling void at any of multiple positions in the ultrasonic cavity by varying the actuation frequency of the ultrasonic transducer, and

the step of effecting a further change in the movement of the fluid-borne particles by changing the location of a node of the ultrasonic standing wave in the ultrasonic cavity comprises varying the actuation frequency of the ultrasonic transducer.

23. The method of claim 21 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein:

the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity,

ultrasonically manipulating fluid-borne particles in step (C) comprises collecting fluid-borne particles at the node of the standing wave at a first location in the ultrasonic cavity, and

the step of effecting a further change in the movement of the fluid-borne particles by changing the location of a node of the ultrasonic standing wave in the ultrasonic cavity comprises moving collected fluid-borne particles to the intersection of the first and second fluid channels.

24. The method of claim 21 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, wherein the ultrasonic cavity has a cross-sectional configuration that is non-uniform in a direction substantially transverse to the direction of flow in the first fluid channel.

25. The method of claim 24 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein

the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity, and

ultrasonically manipulating fluid-borne particles in step (C) comprises:

collecting fluid-borne particles at a first location in the first fluid channel in the ultrasonic cavity by actuating the ultrasonic transducer to establish an ultrasonic standing wave field having a node at the first location, the ultrasonic standing wave field having an axial direction of standing wave propagation substantially perpendicular to the direction of fluid communication through the intersection, and

moving collected fluid-borne particles through the intersection to a second location in the second fluid channel.

26. The method of claim 25 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein collected fluid-borne particles are moved through the intersection to the second fluid channel by establishing an ultrasonic standing wave field node at the second location.

27. The method of claim 25 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein moving collected fluid-borne particles through the intersection to the second fluid channel comprises establishing an ultrasonic standing wave field in the second fluid channel.

28. The method of claim 25 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold wherein moving collected fluid-borne particles through the intersection to the second fluid channel comprises establishing an ultrasonic standing wave field in the intersection.

29. A method for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel and a second fluid channel in fluid

communication with the first fluid channel at an intersection comprising a venturi orifice between the first and second fluid channels; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising at least one ultrasonic transducer, the first fluid channel extending from the inlet port to the ultrasonic cavity and the intersection of the first fluid channel and the second fluid channel being in the ultrasonic cavity, and the ultrasonic transducer being operative to establish an acoustic standing wave field in particle-bearing fluid in the first fluid channel at the ultrasonic cavity;

B) introducing a first fluid comprising fluid-borne particles into the fluid-handling device via the fluid inlet port;

C) collecting fluid-borne particles in the first fluid by actuating the ultrasonic transducer at a frequency and power level effective to establish in the first fluid in the first fluid channel in the ultrasonic cavity an ultrasonic standing wave operative to collect and hold the fluid-borne particles against the flow of the first fluid; and

D) transferring collected fluid-borne particles from the first fluid channel to the second fluid channel through the orifice by varying the ultrasonic standing wave field and creating a effect by a flow of a second fluid through the second fluid channel.

30. A method for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel and a second fluid channel in fluid communication with the first fluid channel at an intersection; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising at least one ultrasonic transducer, the first fluid channel extending from the inlet port to the ultrasonic cavity and the intersection of the first fluid channel and the second fluid channel being in the ultrasonic cavity, and the ultrasonic transducer being operative to establish an acoustic standing wave field in particle-bearing fluid in the first fluid channel at the ultrasonic cavity;

B) introducing a flow of first fluid comprising fluid-borne particles into the first fluid channel via the fluid inlet port;

C) collecting fluid-borne particles in the first fluid at a first location in the first fluid channel in the ultrasonic cavity, not at the intersection, by actuating the ultrasonic transducer at a frequency and power level effective to establish at the first location an ultrasonic standing wave operative to collect and hold the fluid-borne particles against the flow of the first fluid;

D) moving collected fluid-born particles from the first location to the intersection; and

E) exposing collected fluid-borne particles at the intersection to a second fluid to a flow of a second fluid in the second fluid channel.

31. The method of claim 30 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, wherein moving collected fluid-borne particles in step (D) comprises varying the ultrasonic standing wave field.

32. The method of claim 3128 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, wherein moving collected fluid-borne particles in step (D) comprises moving the location of a node of the ultrasonic standing wave field

33. The method of claim 30 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, wherein the step of exposing collected fluid-borne particles to a second fluid comprises moving collected fluid-bourn particles into the second channel.

34. The method of claim 3027 for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, further comprising moving collected fluid-bourn particles from the intersection to a third location in the fluid-handling void of the fluid-handling manifold and holding collected fluid-borne particles at the third location by generating an ultrasonic standing wave field at the third location.

35. A method for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel extending in the manifold from the fluid inlet, and second and third fluid channels each in fluid communication with the first fluid channel at a first and second intersection, respectively; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising a first ultrasonic transducer operative to establish an acoustic standing wave field in particle-bearing fluid at the first intersection, and a second ultrasonic transducer operative to establish an acoustic standing wave field in particle-bearing fluid at the second intersection;

B) introducing a flow of fluid comprising fluid-borne particles into the first fluid channel via the fluid inlet port;

C) collecting fluid-borne particles in the first fluid at the first intersection by actuating the first ultrasonic transducer at a frequency and power level effective to establish at the first intersection an ultrasonic standing wave operative to collect and hold fluid-borne particles against the flow of the first fluid; and

D) moving collected fluid-born particles from the first intersection to the second intersection and collecting fluid-borne particles at the second intersection by actuating the second ultrasonic transducer at a frequency and power level effective to establish at the second intersection an ultrasonic standing wave operative to collect and hold fluid-borne particles against the flow of the first fluid.

36. A method for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising a fluid channel extending in the manifold from the fluid inlet; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising an ultrasonic transducer operative to establish an acoustic standing wave field in particle-bearing fluid;

B) introducing a flow of fluid comprising fluid-borne particles into the fluid channel via the fluid inlet port;

C) collecting fluid-borne particles in the fluid at a first location in the fluid-handling channel by actuating the ultrasonic transducer at a frequency and power level effective to establish at the first location an ultrasonic standing wave operative to collect and hold the fluid-borne particles against the flow of the fluid; and

D) moving collected fluid-born particles from the first location to a second location and collecting fluid-borne particles at the second location by establishing a second ultrasonic standing wave at the second location operative to collect and hold the fluid-borne particles against the flow of the fluid.

37. A method for ultrasonically manipulating fluid-borne particles in a fluid-handling manifold, comprising the combined steps of:

A) providing fluid-handling apparatus comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising a fluid channel extending in the manifold from the fluid inlet;

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising an ultrasonic transducer operative to establish an acoustic standing wave field in particle-bearing fluid in the ultrasonic cavity, the fluid channel extending in the manifold from the fluid inlet at least to the ultrasonic cavity; and

a substantially transparent view port operative for visual observation of fluid-borne particles collected and held in the fluid channel at the ultrasonic cavity by an acoustic standing wave field generated by the ultrasonic transducer;

B) introducing a flow of fluid comprising fluid-borne particles into the fluid channel via the fluid inlet port;

C) collecting fluid-borne particles in the fluid at the ultrasonic cavity by actuating the ultrasonic transducer at a frequency and power level effective to establish an ultrasonic standing wave operative to collect and hold the fluid-borne particles against the flow of the fluid; and

D) visually observing fluid-borne particles through the view port as they are being held in an ultrasonic standing wave in the ultrasonic cavity.

38. A fluid-handling device for ultrasonic manipulation of fluid-borne particles, comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel; and

an ultrasonic particle manipulator defining an ultrasonic cavity and comprising at least one ultrasonic transducer, the first fluid channel extending from the inlet port to the ultrasonic cavity and the ultrasonic particle manipulator being operative to establish an ultrasonic standing wave field in particle-bearing fluid in the first fluid channel at the ultrasonic cavity.

39. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic cavity has a non-uniform configuration.

40. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic transducer has a variable actuation frequency.

41. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator is operative to selectively position a node of an ultrasonic standing wave field in particle-bearing fluid at any of multiple positions in the ultrasonic cavity.

42. The fluid-handling device of claim 39 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic cavity has a non-uniform transverse cross-sectional configuration.

43. The fluid-handling device of claim 39 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic cavity has a configuration that is non-uniform in the direction of flow.

44. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a transverse dimension of the ultrasonic cavity increases stepwise in the direction of flow from the inlet port.

45. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a transverse dimension of the ultrasonic cavity increases continuously in the direction of flow from the inlet port.

46. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a transverse dimension of the ultrasonic cavity decreases stepwise in the direction of flow from the inlet port.

47. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a transverse dimension of the ultrasonic cavity decreases continuously in the direction of flow from the inlet port.

48. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a transverse dimension of the ultrasonic cavity varies wave-like in the direction of flow from the inlet port.

49. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a stepwise configuration in the direction of flow from the inlet port.

50. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a sloping configuration in the direction of flow from the inlet port.

51. The fluid-handling device of claim 4337 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a wave-like configuration in the direction of flow from the inlet port.

52. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by an ultrasonic reflector and has a stepwise configuration in the direction of flow from the inlet port.

53. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by an ultrasonic reflector and has a sloping configuration in the direction of flow from the inlet port.

54. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic reflector and has a wave-like configuration in the direction of flow from the inlet port.

55. The fluid-handling device for ultrasonic manipulation of fluid-borne particles in accordance with claims 43, wherein the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity, at least one of the multiple positions at which the ultrasonic particle manipulator is operative to selectively position an ultrasonic standing wave field in the ultrasonic cavity by varying the actuation frequency of the ultrasonic transducer being at the intersection of the first and second fluid channels.

56. The fluid-handling device of claim 43 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic cavity has a cross-sectional configuration that is non-uniform in a direction substantially transverse to the direction of flow in the first fluid channel.

57. The fluid-handling device of claim 56 for ultrasonic manipulation of fluid-borne particles, wherein:

the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity;

the ultrasonic transducer is operative to establish ultrasonic standing wave fields having an axial direction of standing wave propagation substantially perpendicular to the direction of fluid communication through the intersection;

the cross-sectional configuration of the ultrasonic cavity is non-uniform in the direction of fluid communication through the intersection; and

the ultrasonic particle manipulator is operative to collect fluid-borne particles from fluid in the first fluid channel and move collected fluid-borne particles through the intersection to the second fluid channel by varying the actuation frequency of the ultrasonic transducer.

58. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator is operative to selectively position an ultrasonic standing wave field in the second fluid channel.

59. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator is operative to selectively position an ultrasonic standing wave field in the intersection of the first and second fluid channels.

60. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the dimension of the ultrasonic cavity in the axial direction of standing wave propagation increases stepwise along the direction of fluid communication through the intersection.

61. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the dimension of the ultrasonic cavity in the axial direction of standing wave propagation increases continuously along the direction of fluid communication through the intersection.

62. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the dimension of the ultrasonic cavity in the axial direction of standing wave propagation varies wave-like along the direction of fluid communication through the intersection.

63. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a stepwise configuration along the direction of fluid communication through the intersection.

64. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a sloping configuration along the direction of fluid communication through the intersection.

65. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic transducer and has a wave-like configuration along the direction of fluid communication through the intersection.

66. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by an ultrasonic reflector and

has a stepwise configuration along the direction of fluid communication through the intersection.

67. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by an ultrasonic reflector and has a sloping configuration along the direction of fluid communication through the intersection.

68. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein a surface of the ultrasonic cavity is formed by the ultrasonic reflector and has a wave-like configuration along the direction of fluid communication through the intersection.

69. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the first fluid flow channel and the second fluid flow channel extend substantially parallel each other on opposite sides of a dividing wall between them, and the intersection comprises a passageway through the dividing wall.

70. The fluid-handling device of claim 69 for ultrasonic manipulation of fluid-borne particles, wherein the dividing wall between the first and second fluid flow channels is 10 :m to 30 :m thick.

71. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the first fluid flow channel and the second fluid flow channel intersect each other substantially tangentially.

72. The fluid-handling device of claim 57 for ultrasonic manipulation of fluid-borne particles, wherein the intersection between the first fluid flow channel and the second fluid flow channel comprises a orifice.

73. The fluid-handling device for ultrasonic manipulation of fluid-borne particles in accordance with claim 38 further comprising a second ultrasonic particle manipulator defining a second ultrasonic cavity and comprising at least a second ultrasonic transducer, the fluid-handling void further comprising a second fluid channel in fluid communication with the first fluid channel at a first intersection in the first ultrasonic cavity and a third fluid channel in fluid communication with the first fluid channel at a second intersection in the second ultrasonic cavity, the second ultrasonic transducer being operative to establish an ultrasonic standing wave field in particle-bearing fluid in the fluid-handling void at the second ultrasonic cavity.

74. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, wherein

the fluid-handling void further comprises a second fluid channel in fluid communication with the first fluid channel at an intersection within the ultrasonic cavity, the intersection comprising a passageway through a dividing wall between the first and second fluid channels; and

the ultrasonic particle manipulator is operative to generate a controllably variable asymmetric standing wave in particle-bearing fluid at the intersection, the controllably variable asymmetric standing wave being controllably variable to have a single node moveable from a first location in the first fluid-handling channel to a second location in the second fluid-handling channel.

75. The fluid-handling device of claim 74 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator further comprises electronic controls operative to continuously vary the position of the variable asymmetric standing wave through the intersection.

76. The fluid-handling device of claim 74 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator further comprises electronic controls operative to step-wise vary the position of the variable asymmetric standing wave through the intersection.

77. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, wherein the ultrasonic particle manipulator further comprises a substantially transparent view port at the ultrasonic cavity operative for visual observation of an ultrasonic standing wave field in particle-bearing fluid in the ultrasonic cavity.

78. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising an acoustic reflector positioned opposite the ultrasonic

transducer across the ultrasonic cavity and operative to cooperate with the ultrasonic transducer to establish the ultrasonic standing wave field.

79. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising an alternating current power source for driving the ultrasonic transducer at resonant and non-resonant frequencies of the ultrasonic cavity.

80. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising fluid-borne particles in fluid in the fluid-handling void.

81. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising fluid-borne solid phase extraction (SPE) particles in fluid in the fluid-handling void.

82. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising fluid-borne solid phase extraction (SPE) particles held in a fluidized bed in the first fluid channel at a node of a standing wave in the ultrasonic cavity.

83. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising fluid-borne biological cells in fluid in the fluid-handling void.

84. The fluid-handling device of claim 38 for ultrasonic manipulation of fluid-borne particles, further comprising fluid-borne biological cells in fluid in the first fluid channel, held at a node of a standing wave in the ultrasonic cavity, wherein the fluid-handling

manifold further comprises a substantially transparent view port at the ultrasonic cavity operative for visual observation of the biological cells held at the node of the standing wave in the ultrasonic cavity.

85. An omni-directional fluid-handling device for ultrasonic manipulation of fluid-borne particles, comprising, in combination:

a fluid-handling manifold having a fluid inlet port and defining a fluid-handling void comprising at least a first fluid channel in fluid communication with the fluid inlet port; and

an omni-directional ultrasonic particle manipulator comprising at least one ultrasonic transducer and an acoustic reflector positioned opposite the ultrasonic transducer, the ultrasonic transducer and the acoustic reflector cooperatively defining between them an ultrasonic cavity and operative in any orientation relative to gravity to separate fluid-borne particles from fluid flowed through the ultrasonic cavity by establishing an ultrasonic standing wave field in a portion of the first fluid channel extending through the ultrasonic cavity, wherein the spacing between the ultrasonic transducer and the acoustic reflector is not more than 300 microns.